Prevalence and Determinants of Home Delivery among Indigenous Women in an Aspirational District of Meghalaya, India

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ABSTRACT

Background: In Meghalaya, India, the tribal population faces significant barriers that contribute to lower rates of facility-based births. The aim was to assess the prevalence and determinants of home deliveries in Meghalaya.

Methodology: This community-based cross-sectional study, conducted in an aspirational district of Meghalaya between August 2023 - July 2024. 360 mothers who delivered in the past 12 months were enrolled through a multistage sampling technique. SPSS version 27.0 was used for data analysis, employing bivariate logistic regression with a significance level set at $p < 0.05$.

Results: In this study, 130 (36.1%) of mothers delivered at home, with two-thirds of these deliveries conducted by unskilled birth attendants. Women with two to four children (AOR = 0.09), five or more children (AOR = 0.05), and those living over 5 kilometres from a health facility (AOR = 0.42) were less inclined to utilize institutional delivery services. While the odds for institutional delivery were higher among mothers who attended ≥ 4 antenatal care visits (AOR = 2.97) and those satisfied with ANC services (AOR = 13.96).

Conclusions: The findings underscore the importance of improving access to quality antenatal care and addressing geographical barriers to improve regional institutional delivery rates.

Key-words: Institutional delivery, Utilization, Aspirational District, India

ARTICLE INFO

INTRODUCTION

Maternal mortality remains a significant concern, especially in developing nations. Approximately 2,60,000 maternal deaths were recorded globally in 2023, with a nearly 92% occurring in low-resource settings, many of which were preventable.[1] Numerous studies have also found that the delays in treatment, travel, and decision-making, combined with a lack of knowledge about obstetric difficulties, low utilization of maternal healthcare services, unavailability of sufficient infrastructure and services in the health centres, and hazardous cultural beliefs, are some of the primary factors leading to maternal deaths.[2,3] Lowering maternal mortality is a major challenge for developing countries, like India. To address this issue, the Sustainable Development Goals introduced a maternal health strategy aimed at reducing the maternal mortality ratio (MMR) to below 70 per 100,000 live births by 2030 globally and ensuring that none of the countries surpasses twice the global average.[4] In India, where the MMR is reported at 88 per 100,000 livebirths as per Sample Registration System (2020-22), addressing maternal deaths remains a vital attention for both research and health policy.[5] A global meta-analysis and systematic review reported that the most prevalent causes of maternal deaths were due to non-obstetric complications, followed by obstetric haemorrhage and hypertensive disorders of pregnancy. Other important causes included pregnancy with abortion, pregnancy-related infections, unanticipated complications and cases with unknown or undetermined causes.[6]

Providing facility-based delivery care throughout the childbirth process i.e., before, during, and after birth, has been shown to reduce maternal mortality and improve overall health outcomes.[7] According to the National Family Health Survey-5 (NFHS-5), 58.1% of births in Meghalaya took place in health facilities, with 64.0% of these births overseen by qualified health personnel.[8] In comparison, the national averages are 88.6% for deliveries in facilities and 89.4% for births attended by skilled professionals. In the Ri Bhoi district, 56.9% of mothers delivered in healthcare facilities, and 65.8% of births were conducted by trained health personnel.[9]

Meghalaya, located between Assam and Bangladesh, covers an area of approximately 22,429 sq. km. According to the 2011 census, the state has a population of 2.97 million. The state's population density is 132 people per km², with 75.95% male and 72.89% female. The overall literacy rate is 74.43 %.[10] Ri Bhoi district, located in Meghalaya, is one of India's Aspirational Districts, designated by the National Institution for Transforming India (NITI) Aayog under the Aspirational Districts Programme (ADP) as a high-priority district because of poor accessibility and challenging health problems. This program focuses on enhancing the quality of living and economic productivity in these districts.[11]

Understanding local context is essential for designing effective maternal health interventions; however, given the paucity of data on the usage of institutional delivery services in the area of study. Hence, this study was conducted to assess the prevalence of institutional deliveries and its associated factors in Meghalaya, India.

METHODOLOGY

Study Design and Setting: A quantitative approach was used in this research, which utilized a community-based cross-sectional design. The study took place in Ri Bhoi District of Meghalaya, India, which is identified as an Aspirational District. Data collection was done over a period spanning August 2023 to July 2024.

Sample size and sampling: According to NFHS-5,[9] the prevalence of institutional delivery was 58.1 %. Assuming a confidence level of 95% and a precision of 7%, the minimum sample size was 191. A design effect of 1.7 and a 10% non-response rate was included into the calculations, leading to a final sample size of 360. Participants were chosen from the records supplied by the public health system, particularly through Accredited Social Health Activists (ASHAs) and Anganwadi workers. The eligibility criteria required women to be a minimum of 18 years old, have given birth within the last 12 months, and reside in the study area. Women who had moved out of the village or were unavailable after three visits were excluded.

The selection of participants involved a multistage sampling technique. First, Ri Bhoi District was purposively selected because it is the sole Aspirational District in Meghalaya. Next, all three blocks within the district were included through complete enumeration. From each block, two Primary Health Centres (PHCs) or Community Health Centres (CHCs) were chosen using a simple random method (lottery). Subsequently, three villages per block were selected based on their distance from the chosen PHC/CHC: the closest village, one equidistant, and the farthest. Finally, 20 eligible women were recruited from each selected village, totalling 60 participants per PHC/CHC, using a simple random method (lottery) based on the sampling frame from the public health system workers.

Data Collection and Study Tools: Data collection was carried out through face-to-face interviews conducted at the village level. A predesigned and validated questionnaire was used and translated into local language to ensure clarity. Information gathered included demographic details, reproductive history, and delivery practices. Data was recorded using a pen and paper format. The Standard of Living Index (SLI) was derived from the criteria established by the National Family Health Surveys (NFHS) to assess the living standards of participants.

Data Management and analysis: The data collected was initially imported into Excel ver.10 (Microsoft

Inc), then cleaned and recoded. Descriptive analysis was carried out to calculate the frequency and percentage of variables. The relationship between predictors and outcomes was evaluated using crude odds ratios (COR) and adjusted odds ratios (AOR). Statistically significant variables identified in the univariate analysis were included in the final multivariable logistic regression model. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations: Ethical clearance was granted by the Institutional Ethics Committee of Sikkim Manipal Institute of Medical Sciences (SMIMS/

IEC/2023-66) dated 27/05/2023. Written informed consent was provided by all participants. Additionally, permissions were also acquired from the Directorate of Health Services and the District Medical & Health Officer of Ri Bhoi.

RESULTS

Out of 360 mothers interviewed in the study, 130 mothers (36.1%), said they delivered at home. The average age of the mothers was 28.04 years, with a standard deviation of 6.24 years, and their ages varied from 19 to 45 years.

Table 1: Sociodemographic characteristics of respondents (n=360)

Characteristics	Home delivery (n=130) (%)	Institutional delivery (n=230) (%)	Total (N=360) (%)	p-value
Age of the participants (in years)				
≤ 24	46 (35.4)	77 (33.5)	123 (34.2)	0.94
25-34	61 (46.9)	111(48.3)	172 (47.8)	
≥ 35	23 (17.7)	42 (18.3)	65 (18.0)	
Age of the husbands (in years)				
≤ 24	18 (13.8)	38 (16.5)	56 (15.6)	0.43
25-34	77 (59.2)	120 (52.2)	197 (54.7)	
≥ 35	35 (26.9)	72 (31.3)	107 (29.7)	
Educational level of participants				
Illiterate	3 (2.3)	6 (2.6)	9 (2.5)	0.010*
Just Literate	8 (6.2)	9 (3.9)	17 (4.7)	
Up to 5th Standard	81 (62.3)	105 (45.7)	186 (51.7)	
Up to 10th Standard	19 (14.6)	68 (29.6)	87 (24.2)	
Up to 12th Standard	12 (9.2)	33 (14.3)	45 (12.5)	
Graduate/Diploma	7 (5.4)	8 (3.5)	15 (4.2)	
Post Graduate	0 (0.0)	1 (0.4)	1 (0.3)	
Educational level of husband				
Illiterate	8 (6.2)	7 (3.0)	15 (4.2)	0.030*
Just Literate	9 (6.9)	19 (8.3)	28 (7.8)	
Up to 5th Standard	76 (58.5)	101 (43.9)	177 (49.2)	
Up to 10th Standard	21 (16.2)	62 (27.0)	83 (23.1)	
Up to 12th Standard	12 (9.2)	22 (9.6)	34 (9.4)	
Graduate/Diploma	4 (3.1)	16 (7.0)	20 (5.6)	
Post Graduate	0 (0.0)	3 (1.3)	3 (0.8)	
Occupation status				
House wife	47 (36.2)	98 (42.6)	145 (40.3)	0.12
Farmer	69 (53.1)	101 (43.9)	170 (47.2)	
Daily wage labourer	8 (6.2)	22 (9.6)	30 (8.3)	
Private Job	6 (4.6)	5 (2.2)	11 (3.1)	
Government Job	0 (0.0)	4 (1.7)	4 (1.1)	
Marital Status				
Married staying with husband	128 (98.5)	228 (99.1)	356 (98.9)	0.56
Married but not staying with husband	2 (1.5)	2 (0.9)	4 (1.1)	
Type of Family				
Nuclear	89 (68.5)	137 (59.6)	226 (62.8)	0.07
Joint	38 (29.2)	76 (33.0)	114 (31.7)	
Extended	3 (2.3)	17 (7.4)	20 (5.6)	
Family size				
Less than 3	15 (11.5)	31 (13.5)	46 (12.8)	0.84
04-06	73 (56.2)	120 (52.2)	193 (53.6)	
07-09	37 (28.5)	67 95(29.1)	104 (28.9)	
≥ 10	5 (3.8)	12 (5.2)	17 (4.7)	
Monthly Family income (in Rs)				
≤5000	30 (23.1)	32 (13.9)	62 (17.2)	0.84
5001-10,000	85 (65.4)	169 (73.5)	254 (70.6)	
≥ 10,001	15 (11.5)	29 (12.6)	44 (12.2)	
Standard of Living Index				
Low	55 (42.3)	102 (44.3)	157 (43.6)	0.21
Medium	75 (57.7)	123 (53.5)	198 (55.0)	
High	0 (0.0)	5 (2.2)	5 (1.4)	

*Statistically significant at p-value <0.050

Most mothers, 172 (47.8%), were between 25 and 34 years old. Among mothers who delivered at home, 62.3% had education only up to the 5th grade, compared to 45.7% of those who delivered in health facilities. There were more mothers with higher education levels, up to the 10th and 12th grades, who chose to deliver in institutions. Additionally, husbands with higher education were more likely to support their wives in opting for institutional delivery. 58.5% of home deliveries involved husbands educated up to the 5th standard, compared to 43.9% for institutional deliveries. Home deliveries were slightly higher among the farmers (53.1%) and the housewives (36.2%). Almost all women in both groups were married and stayed with their husbands. More home deliveries in nuclear families, 89 (68.5%), while institutional deliveries are slightly higher in joint families (33.0%) and extended families (7.4). The majority of the respondents, 193 (53.6) had a family size of four to six members. Home deliveries were more prevalent among those with a low standard of living index ,55 (42.3%) while institutional deliveries were slightly higher in households with a higher standard of living index (Table 1).

Obstetrics and maternal characteristics: Most of the participants reported getting married between the ages of 19 and 23 years (58.9%). About 40% of the mothers with second to fourth gravida delivered at home or health institutions. Institutional deliveries were higher among in first parity mothers (46.1%) compared to home deliveries (36.9%). All women with institutional deliveries had one ANC visit at least (100%), whereas 35.4% of mothers who had home delivery did not attend any ANC visits. Also, 61.5% of mothers who had home delivery were unsatisfied with ANC services, whereas 90% of mothers who had institutional deliveries were satisfied (Table 2).

Table 2: Obstetrics and maternal characteristics of respondents (n=360)

Variables	Home delivery (n=130) N (%)	Institutional delivery (n=230) N (%)	Total (N=360) (%)	p-value
Age at first marriage (in years)				
≤18	21 (16.2)	35 (15.2)	56 (15.6)	0.57
19-23	80 (61.5)	132 (57.4)	212 (58.9)	
≥ 24	29 (22.3)	63 (27.4)	92 (25.6)	
Gravida				
1	47 (36.2)	106 (46.1)	153 (42.5)	0.09
02-Apr	59 (45.4)	97 (42.2)	156 (43.3)	
≥5	24 (18.5)	27 (11.7)	51 (14.2)	
Parity				
1	48 (36.9)	113 (49.1)	161 (44.7)	0.050*
02-Apr	60 (46.2)	93 (40.4)	153 (42.5)	
≥5	22 (16.9)	24 (10.4)	46 (12.8)	
Antenatal care visit during last pregnancy				
Yes	84 (64.6)	230 (100.0)	314 (87.2)	<0.001*
No	46 (35.4)	0 (0.0)	46 (12.8)	
Number of ANC Visits				
0-3	115 (88.5)	139 (60.4)	254 (70.6)	<0.001*
≥4	15 (11.5)	91 (39.6)	106 (29.4)	
Satisfaction with ANC services				
Unsatisfied	80 (61.5)	23 (10.0)	103 (28.6)	<0.001*
Satisfied	50 (38.5)	207 (90.0)	257 (71.4)	

*Statistically significant at p-value <0.050

Table 3: Accessibility characteristics of the respondents (n=360)

Characteristics	Home delivery (n=130) N (%)	Institutional delivery (n=230) N (%)	Total (N=360) (%)	p-value
Nearest Health Facility				
Primary Health Centre	46 (35.4)	70 (30.4)	116 (32.2)	0.22
Community Health Centre	30 (23.1)	78 (33.9)	108 (30.0)	
Subcentre HWC	38 (29.2)	49 (21.3)	87 (24.2)	
Private Hospital	11 (8.5)	24 (10.4)	35 (9.7)	
Private clinic	5 (3.8)	8 (3.5)	13 (3.6)	
District Hospital	0 (0.0)	1 (0.4)	1 (0.3)	
Distance to the nearest Health Facility (in Km)				
0-4	36 (27.7)	97 (42.2)	133 (36.9)	0.010*
≥5	94 (72.3)	133 (57.8)	227 (63.1)	
#Travelling cost to reach the nearest Health Facility (in Rs)				
No Cost	23 (17.7)	50 (21.7)	73 (20.3)	0.66
≤50	18 (13.8)	30 (13.0)	48 (13.3)	
≥51	89 (68.5)	150 (65.2)	239 (66.4)	

*Statistically significant at p-value <0.050; #Round trip cost (in Rs)

Table 4: Type of delivery and its determinants among respondents (n=360)

Variables	Frequency(%)
Place of delivery of your last child	
Health Facility	230 (63.9)
Home	130 (36.1)
Place of institutional delivery(n=230)	
Community Health Centres	85 (36.96)
District Hospitals	53 (23.04)
Primary Health Centres	50 (21.74)
Private Hospitals	32 (13.91)
Subcentres	8 (3.48)
Tertiary Care Centres	2 (0.87)
Home deliveries attended by Trained Birth Attendant (n=130)	
Yes	43 (33.08)
No	87 (66.92)
Reasons for home delivery (n=130)	
Not necessary	44 (33.85)
Nobody to look after children at home	18 (13.85)
Cost	17 (13.08)
Transport not available	15 (11.54)
Husband/family didn't allow	14 (10.77)
Fear for injections/surgery	9 (6.92)
Others	8 (6.15)
Not enough time to reach health centre	5 (3.85)

Accessibility characteristics: Among women who delivered at home, the majority had either a Primary Health Centre (35.4%) or a Subcentre HWC (29.2%) as their closest healthcare facility. Respondents residing more than 5 km from a health facility had more home deliveries (72.3%) than institutional deliveries (57.8%), while those living less than 4 km were more likely to choose institutional delivery (42.2%) over home delivery (27.7%). Approximately 66.4% of mothers who incurred costs exceeding Rs 51 to access the closest health facility gave birth either at home or in healthcare institutions (Table 3).

Institutional delivery service utilization: Of 360 respondents, 230 (63.9%) of women delivered in the health facilities during the last delivery, with 85 (36.9%) mothers delivering at the Community Health Centres. Among the respondents who deliv-

ered at home, 87 (66.92%) were attended by the Untrained Birth Attendants. The primary reason for choosing home delivery is shown in Table 4.

Factors associated with institutional delivery service utilization: Table 5 presents the analysis of both bivariate and multivariable logistic regression regarding factors that influence the use of institutional delivery services. Variables that showed statistical significance (p-value < 0.05) in the binary logistic regression were included in the multivariable logistic regression analysis to account for potential confounders. Consequently, mothers who had four or more antenatal care (ANC) visits (AOR=2.97; 95% CI: 1.50 to 5.84), expressed satisfaction with ANC services (AOR= 13.96; 95% CI= 7.57 to 25.74) were significantly linked to an increase in the use of institutional delivery services. In contrast those mothers who lived more than 5 km from the nearest healthcare center (AOR=0.42, 95% CI=0.23 to 0.78), had 2-4 children (AOR=0.09, 95% CI=0.01 to 0.96), and had 5 or more children (AOR=0.05, 95% CI=0.00 to 1.09) had significantly lower odds of institutional delivery. Though the p value is significant the confidence interval approaches unity. Hence the association may be due to chance. The very low adjusted odds ratios for parity (AOR ≈ 0.05–0.09) may be a possible effect of multivariable adjustment or sparse data in reference categories.

Mothers who attended four or more ANC visits in their previous pregnancy were twice as likely to deliver in health centres compared to those with fewer visits. Mothers who expressed satisfaction with the ANC services were fourteen times more likely to give birth in health centres than those who were dissatisfied with their ANC appointments. Women living more than 5 km away from the health facility were 58% less likely to give birth in health centres. Those who had between two and four children had a 91% lower likelihood of delivering at health centres. Similarly, respondents with more than five children faced a 95% decreased likelihood of giving birth at a health centre.

Table 5: Bivariate and multivariable logistic regression analyses on factors associated with institutional delivery service utilization (n=360)

Variables	Institutional Delivery		Unadjusted Odds Ratio (95% CI)	p -value	Adjusted Odds Ratio (95% CI)	p -value
	Yes N=230 (63.9 %)	No N=130 (36.1 %)				
Number of ANC visit						
<3 visits	139 (54.7)	115 (45.3)	1		1	
≥4 visits	91 (85.8)	15 (14.2)	5.02 (2.76-9.14)	<0.001*	2.97 (1.50-5.84)	0.002*
Satisfaction with ANC services						
Unsatisfied	23 (22.3)	80 (77.7)	1		1	
Satisfied	207 (80.5)	50 (19.5)	14.40 (8.23-25.14)	<0.001*	13.96 (7.57-25.74)	<0.001*
Distance to the nearest health facility (in Km)						
0-4 Km	97 (72.9)	36 (27.1)	1		1	
≥5Km	133 (58.6)	94 (41.4)	0.53 (0.33-0.84)	0.01*	0.42 (0.23-0.78)	0.040*
Parity						
1	113 (70.2)	48 (29.8)	1		1	
2-4	93 (60.8)	60 (39.2)	0.66 (0.41-1.05)	0.01*	0.09 (0.01-0.96)	0.050*
≥5	24 (52.2)	22 (47.8)	0.46 (0.24-0.90)	0.02*	0.05 (0.00-1.09)	0.050*

*Statistically significant at p-value <0.050 in binary and multivariable logistic regression analyses

DISCUSSION

The study indicated that about 36.1% of deliveries took place at home. Antenatal care visits and high satisfaction levels positively predicted institutional delivery, while higher parity and greater distances from health facilities negatively predicted it.

The percentage of institutional deliveries reported in this study (63.9%) closely aligns with findings from a similar Indian study[12] which reported 64.1% in Jharkhand and 66.2% in Bihar. However, it remains lower than the national estimate reported in NFHS-5 survey (88.6%)[8] and in Manipur (80.0%)[13], while exceeding the rates reported in Nagaland (45.7%)[14]. These differences highlight ongoing regional variations in access to and uptake of maternal health services.

This study reported that approximately 66.9% of home deliveries were conducted by untrained birth attendants, highlighting the significant prevalence of such deliveries in many developing regions. This lack of skilled assistance poses serious risks to both maternal and neonatal health. Several national and international studies support this result.[15-17]

In the present study, along with multiple others, highlights a significant association between institutional delivery and educational levels of both women and their partners. Numerous surveys conducted in India have shown that educated couples are more likely to select hospital deliveries because they understand the health risks of giving birth at home.[18-20]

The current study shows that having four or more visits during pregnancy is a key predictor of opting for institutional delivery. Women who attended regular antenatal care (ANC) visits were more inclined to choose institutional delivery, which ultimately leads to improved neonatal and maternal health outcomes, as corroborated by various studies. This result aligns with numerous research studies that also showed that an increase in ANC visits enhances the likelihood of institutional delivery.[21,22] In the context of the women of Meghalaya, the critical barriers of institutional delivery are mainly inaccessibility due to remote distance structural challenges like poor health infrastructure, poor road conditions, inadequate transport, and geographic inaccessibility which are common in the state's hilly terrain pose major barriers. Moreover, the findings are a reflection of strong cultural preferences like home-based deliveries among multiparous women.

Additionally, a significant association was found between institutional delivery and satisfaction with ANC services. Women who expressed high satisfaction levels with ANC services were more inclined to choose institutional delivery. High satisfaction with ANC services motivates women to seek healthcare facilities for childbirth, thus improving outcomes for both mothers and newborns. This observation aligns with earlier research conducted in India.[23]

The distance to healthcare facilities posed a significant barrier to institutional delivery in this study. This finding resonates with several studies where geographical accessibility as a critical determinant of maternal healthcare utilization.[24,25] Improving transportation and expanding health facility coverage in remote areas can mitigate this barrier and enhance institutional delivery rates.

This study also revealed that higher parity is linked to reduced odds of institutional delivery. These findings are consistent with several other studies.[26,27] Addressing these perceptions through education and improved healthcare access is crucial for enhancing maternal health outcomes.

STRENGTH AND LIMITATIONS

Although this study offers valuable insights, several limitations must be considered. In this study, the analysis was based on self-reported data, which may be affected by recall bias, thereby impacting the accuracy of the data provided. Nonetheless, the cross-sectional nature of the study limits its ability to establish causality, hence the observed associations should be interpreted with caution. Also, the conclusion from this study may not be generalised for the whole State and the urban areas. Potential social desirability bias may have influenced mothers' responses. The absence of qualitative exploration of cultural beliefs and practices surrounding home delivery decisions restricts deeper understanding of the socio-cultural context.

CONCLUSION

This study highlights that though a majority of mothers in Meghalaya opted for institutional deliveries, reflecting progress in maternal healthcare utilization, we still observed a high proportion of deliveries by unskilled birth attendants which is a matter of great concern. However, further efforts are needed to enhance institutional deliveries and improve maternal health outcomes in this vulnerable population. To achieve this, increasing community awareness about antenatal care (ANC) and available health schemes through initiatives like Village Health Councils and Community Gender Health Activists is crucial. Additionally, improving access to ANC services by strengthening transportation facilities, and utilization of government schemes can encourage more women to seek skilled care. Together, these contextual realities highlight the need for improved infrastructure, reliable transport, and community-sensitive interventions to ensure equitable access to safe delivery services in Meghalaya. Strengthening these strategies can ensure sustained improvements in maternal healthcare in Meghalaya.

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Availability of Data: Data available upon reasonable request from the corresponding author at tshering.d@smims.smu.edu.in

Declaration of Non-use of Generative AI Tools: This article was prepared without the use of generative AI tools for content creation, analysis, or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

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